

MIDI

SO-07-0790

Introduction to MIDI

MIDI (Musical Instrument Digital Interface) is a hardware and software standard used throughout the industry for communication between sound devices.

With MIDI, musicians can use their favorite keyboard to perform or record sound textures from a variety of instruments.

MIDI specifications are available in *MIDI 1.0, Print Version 4.1, Detailed Specification Document* from the International MIDI Association, 5316 W. 57th St., Los Angeles, CA 90056.

Typical MIDI network

7.2 Studio operations

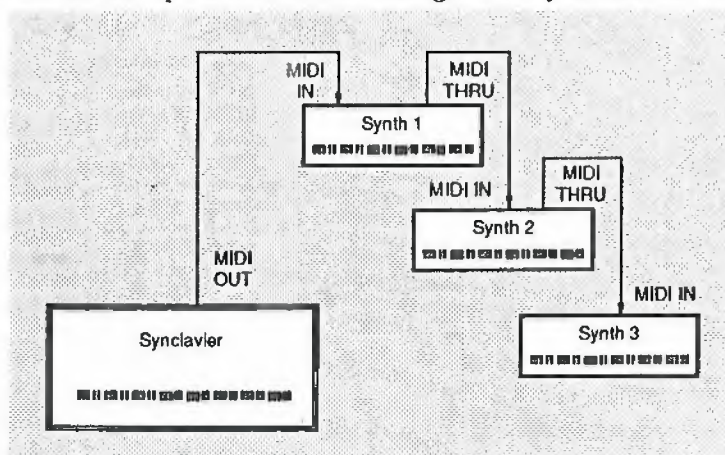
MIDI equipment

MIDI devices are synthesizers, sequencers, rhythm machines and other types of audio processing equipment designed to send and receive sound data using MIDI cables and a language of MIDI signals and messages.

- You can send notes and expression signals from MIDI keyboards and keyboard controllers, guitars, percussion pads and pitch-to-MIDI converters.
- You can record signals with MIDI sequencers.
- You can use MIDI-controlled sampling units to reproduce live sounds digitally and MIDI synthesizers to produce synthesized sound.
- You can do signal processing with MIDI-controlled digital reverb and delay, equalizers and mixers.

Often more than one type of MIDI device is contained in one unit. A MIDI keyboard, for example, may include a synthesizer; a programmable drum machine may have both a sampling unit and a synthesizer as well as some type of sequencer. The Synclavier combines a keyboard, synthesizer, sampler and sequencer in one unit.

You can set up a MIDI network using a variety of MIDI devices.



MIDI units

New England Digital offers two types of MIDI units.

MIDI module

Each MIDI module built into either the Synclavier or the Direct-to-Disk has MIDI IN, MIDI OUT, MIDI THRU and MIDI AUX ports. The Synclavier system can accommodate a maximum of eight MIDI modules for a total of 32 outputs.

You set MIDI inputs and outputs from the MIDI display in the Real-Time Performance system. Documentation for using the MIDI module is in this manual.

MIDInet

MIDInet, an external MIDI routing and processing device, offers 8 input ports and 8 output ports. Expansion units are available to provide up to 128 input and output ports.

You assign MIDInet routings and processes from the MIDInet software module. Documentation for MIDInet is in the *New Software* manual.

Introduction to MIDI (con't)

MIDI ports

Each Synclavier or Direct-to-Disk MIDI module contains a MIDI IN port, a MIDI THRU port and four MIDI OUT ports. A MIDI AUX port is provided with each pair of MIDI modules. When multiple modules are installed only the first MIDI IN and MIDI AUX ports are active.

- Each MIDI OUT port sends messages to MIDI IN ports of other MIDI devices.
- The MIDI IN port receives information from the MIDI OUT or MIDI THRU ports of other MIDI devices.
- The MIDI AUX port is a specialized MIDI IN port which responds only to sync signals.
- The MIDI THRU port acts as a MIDI OUT port when a device is in the middle of a MIDI network by sending whatever signals are received at the MIDI IN port.

MIDI messages can be sent on 16 separate channels. Each MIDI OUT or MIDI THRU port can send signals on a single channel or on all 16 channels; each MIDI IN port can be set to receive signals on a single channel or on all 16 channels.

MIDI signals

Signals are sent serially on a single cable from a MIDI OUT or MIDI THRU port to a MIDI IN port at a rate of 31.25 kHz or 31,250 bits per second. Thus, more than 3000 10-bit MIDI messages can be transmitted per second. A chord performed on the master keyboard is sent out as individual notes, a few milliseconds apart. The MIDI transmission rate makes the ear perceive the notes as simultaneous.

The MIDI signal rate is too slow, however, to transmit more than about 10 notes at one time from a single MIDI OUT port without perceptible delays.

The number of MIDI devices that can be connected in a chain (using MIDI THRU to MIDI IN) is also limited. Cumulative distortion may appear with more than four MIDI devices on one chain. Additional MIDI OUT ports or a MIDI THRU box avoid this problem by providing parallel outputs.

The Synclavier and Direct-to-Disk units provide multiple MIDI OUT ports so that it is seldom necessary to connect more than one or two devices in a chain.

MIDI specifications

Baud rate	31.25 Kbaud \pm 1% asynchronous
Period	320 msec per serial byte
Connectors	DIN 5-pin (180 degrees) panel mount receptacle with pins 1 and 3 unused
Cables	50' maximum terminated by corresponding 5-pin DIN plug shielded twisted pair with shield connected to pin 2 at both ends.

Channel messages

When a musician plays a note on a MIDI keyboard, a **note-on message** is sent through the MIDI OUT port assigned to the keyboard. A note-on message contains the channel number over which the data is being sent and the note or key number (pitch).

Controller messages indicating real-time effects or expression such as the velocity of the keystroke or changes in key pressure are also transmitted. A controller message contains a channel number, an identifier for the specific controller and a value representing the position or indication of that controller.

When a MIDI instrument receives a **note-on message** through its MIDI IN port, it determines whether the message is on a channel to which it is set to respond. If it is, it plays the note; if not, it does not play. In either case it passes the message on through its MIDI THRU port to the next instrument in the network.

Controller messages indicating real-time effects or expression are received and acted upon in the same way if the receiving instrument is equipped to receive them. If not, those messages are ignored. For example, a device not equipped with the velocity sensitivity feature ignores the keystroke velocity information but sends it on through its MIDI THRU port.

When the player releases the key, a **note-off message** for that note is sent. This message also has a channel identifier on it. The instruments set to that channel respond by stopping that note.

System messages

Three types of **system messages** may be sent through MIDI. System messages affect all channels.

- **System real-time messages** are used primarily to start, stop and synchronize sequencers and drum machines. They are sent when the START, STOP, CONTINUE, RECORD or PUNCH IN buttons are pressed.
- **System common messages** convey information applicable to all MIDI channels in a system. The song pointer is a system common message.
- **System exclusive messages** are defined by each manufacturer to implement functions specific to its own components. System exclusive messages can control such things as timbre parameters, sequence and timbre data dumps, and external MIDI effects and mixers.

Setting MIDI parameters

Before performing or recording with MIDI, you must set all the MIDI devices on your MIDI network for sending and receiving MIDI information. On the Direct-to-Disk, MIDI input and output parameters are set from the MIDI Display and the Sequence Editor. On the Synclavier, parameters are set from either of the above displays or from the keyboard control panel. For information on setting parameters on your other MIDI devices, consult the manuals for those devices.

The Sequence Editor displays all 200 tracks of the internal sequencer. The MIDI display shows only 32 at a time. You can change the tracks displayed on the MIDI Display in groups of eight.

1. Move the cursor to the number for any track in the group of eight that you want to change.
2. Type any number from 1 to 200 and press Return.

All eight track numbers of the selected group change to reflect the new assignment. If you have a Synclavier keyboard, the tracks accessed by the TRACK SELECT buttons on the keyboard also change.

MIDI Display

	Instrument Name	Out	Chan	Pres
KBD	RHODES			
1	ELECTRIC KIT	1	1	
2	PHASED BASS	1	1	
3	RIDE CYMBAL	1	1	
4	BONGO BELLS	1	1	
5	PERCUSSION	1	2	
6	TRIANGLE	1	2	
7	CONGA	1	3	
8	VIBES	1	3	
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

MIDI ROUTING DISPLAY

1. Move cursor with arrow keys
2. Assign new track numbers and routings
3. Press space bar to increment values
4. Available outputs: 4

Sync In: OFF Out: 1 Inputs: ALL Echo: ON

21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		

Current Catalog: W0:

Sequence Editor

SEQUENCE EDITOR

START STOP RECALL RUN/CONT 01:22:36:19.2

Cut Move Copy

Paste Merge Fill

Clipboard Length: 00:00:23:14.03

CUT: Delete Notes & Time

TO: Clipboard

PASTE: Insert Notes & Time

FROM: Clipboard

COUNT: 1

Click: ON Just: OFF SMPTE

Mark: ON 00:00:00:00.00

M1	M2	M3	M4	M5	M6	M7	M8
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64
65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96
97	98	99	100	101	102	103	104
105	106	107	108	109	110	111	112
113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128
129	130	131	132	133	134	135	136
137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152
153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168
169	170	171	172	173	174	175	176
177	178	179	180	181	182	183	184
185	186	187	188	189	190	191	192
193	194	195	196	197	198	199	200

Bounce

Change Duration

Change RTE

Change Velocity

Cut/Paste

Edit Filter

Fit to Time

Justify

MIDI Mapping

Settings

Sequence File

GO!

SMT

Track Volume

Transpose

Unwrap Loops

L1 L2 L3 L4 L5 L6 L7 L8

Keyboard control panel



MIDI output parameters

When the Synclavier is the sending device, you set MIDI output parameters to route keyboard, track and synchronization signals out the desired port and channel. You can also set some parameters to control the type of data sent.

MIDI OUT port and channel settings are saved with the sequence.

Setting keyboard and track output from the MIDI Display

You assign MIDI OUT ports and channels separately for the keyboard (current timbre) and each sequencer track.

1. Move the cursor to the Out column of the keyboard or desired track, type in the desired port number and press Return. Or press the Spacebar to step through the port numbers.

The keyboard or selected track is assigned to the designated MIDI OUT port.

2. Move the cursor to the Chan column, type in the desired channel number and press Return. Or press the Spacebar to step through the channel numbers.

The keyboard or selected track is assigned to the designated channel of the assigned MIDI OUT port.

3. If you want to send pressure information for the keyboard or selected track, move the cursor to the Pres column and press the Spacebar to select INDV (individual) or CHAN (channel).

Pressure settings are explained more fully in the section "Sending and receiving real-time effects."

Whenever a new timbre is recalled to the keyboard or a track, the MIDI OUT and CHAN settings must be reassigned. If you move a timbre from one track to another, the MIDI OUT and CHAN settings are transferred with the timbre.

Setting keyboard output from the keyboard control panel

You can assign the keyboard to a MIDI OUT port and channel using the MIDI button and the control knob.

1. Press the MIDI button.

It lights. The display window shows

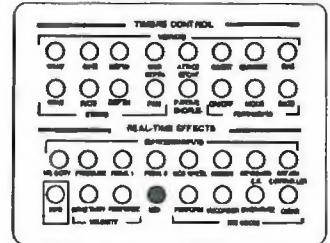
MIDI: OUTPUT OFF

2. Use the control knob to step through all the possible settings (MIDI: O[1]C[2], MIDI: O[1]C[3], etc.) up to the limits of your installed MIDI system.
3. Turn the control knob counterclockwise to turn off the MIDI option.

The display window shows

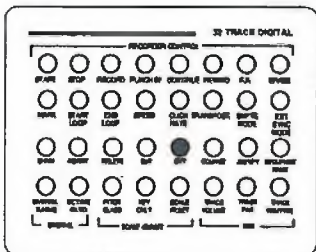
MIDI: OUTPUT OFF

Once you have assigned the MIDI output and channel for the keyboard timbre, any track recorded with that timbre retains these MIDI assignments when the sequence is saved to disk.

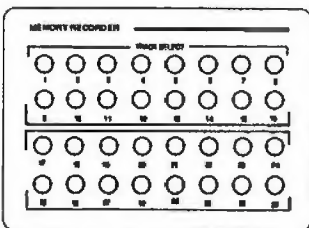


MIDI
panel 5

MIDI output parameters (con't)



SKT
panel 2



TRACK SELECT
panel 3

Setting track output from the keyboard control panel

You can assign MIDI OUT port and channel for a track timbre by linking the track timbre to the keyboard timbre.

1. Hold SKT while you press a TRACK SELECT button; then release both.

The SKT button blinks.

The selected track timbre is brought to the keyboard. The keyboard timbre and track timbre are linked and remain so until you exit the SKT blinking mode (see below) or recall another timbre to the keyboard or track.

2. Assign MIDI output and channel for the keyboard timbre as described on the preceding page.

Changes made to the keyboard timbre also affect the selected track timbre.

3. Press and release SKT; then press STOP.

The SKT blinking mode is turned off. The selected track timbre and the keyboard timbre retain the modifications made.

Setting MIDI output synchronization

You can assign a MIDI OUT port for synchronization signals from the MIDI Display. (MIDI Sync Out cannot be set from the keyboard control panel.)

- Move the cursor to the Sync Out switch and press the spacebar repeatedly until the desired port number appears.

MIDI synchronization signals are assigned to be transmitted on all channels of the selected port.

Setting MIDI echo

You can turn the Synclavier MIDI OUT port assigned to the keyboard into a MIDI THRU port using MIDI echo. You use this feature to send incoming MIDI signals out a second MIDI THRU port.

- On the MIDI Display, click the field after Echo: and press the spacebar until ON appears.

MIDI information received at the MIDI IN port is sent out the port assigned to the keyboard and the MIDI THRU port.

MIDI echo can also be turned on from the keyboard control panel.

- Press and hold the MIDI button; then press START.

The display window shows

MIDI Echo: ON

MIDI messages received at the MIDI IN port are echoed at the MIDI out port assigned to the keyboard.

To turn off the MIDI echo:

- Press and hold the MIDI button; then press STOP.

MIDI input parameters

When the Synclavier is the receiving MIDI device, you set input parameters so that it responds to the desired input channels.

Input settings are **not** saved with the sequence.

Setting MIDI input

There is only one active MIDI IN port. You can set it to receive any or all 16 channels.

To set MIDI input from the MIDI display:

1. Move the cursor to the Inputs field at the middle right of the MIDI Display.
2. Step through the available selections until ALL or the desired channel appears.

The Synclavier is set to respond to input on the selected channel(s) of the MIDI IN port.

To set MIDI input from the Sequence Editor:

1. Select MIDI Mapping from the Sequence Editor commands panel.
2. Step the MIDI Input field through the available selections until ALL or the desired channel appears.

The Synclavier is set to respond to input on the selected channel(s) of the MIDI IN port.

When received on a single channel from a MIDI keyboard or a MIDI sequencer, MIDI signals are played with the current timbre. You can record the incoming signals directly into the internal sequencer on selected tracks.

Multitrack routing from the Sequence Editor

You can route incoming MIDI channels to any of the 200 sequencer tracks using the MIDI Mapping command from the Sequence Editor.

1. Select MIDI Mapping from the Sequence Editor commands panel.
2. Toggle the word Keyboard to Recorder at the upper right of the Dialog panel.
3. Change the track assigned to any MIDI channel by clicking on the track number and typing in a new number.

Incoming MIDI notes are routed to the track selected for each channel and play or record using the sequencer track timbres.

Sequence Editor MIDI mapping dialog

Channel:	1	2	3	4	5	6	7	8	MIDI Mapped
Track:	1	2	3	4	5	6	7	8	to: Keyboard
									MIDI Input: All
Channel:	1	2	3	4	5	6	7	8	
Track:	1	2	3	4	5	6	7	8	READY TRACKS
									ALL SAFE

MIDI input parameters (con't)

Multitrack routing from the keyboard control panel

By default, all incoming MIDI channels are routed to the keyboard. You can route them to the first 16 tracks of the sequencer using the keyboard control panel.

1. Press and hold the MIDI button while you press the POLYPHONY MODE button.

The display window shows

MIDI CHAN MAPPED
TO: KEYBOARD

All MIDI channels are routed to the Synclavier keyboard. Incoming MIDI notes play the keyboard timbre.

2. Press and hold the MIDI button while you press the POLYPHONY MODE button again.

The display window shows

MIDI CHAN MAPPED
TO: RECORDER

MIDI channels are routed to tracks in the sequencer. Incoming notes play the track timbres currently in the sequencer. The notes coming in on MIDI channel 1 are played with the Synclavier timbre on track 1, the notes coming in on MIDI channel 2 are played with the Synclavier timbre on track 2, and so on.

Setting MIDI input synchronization from the terminal

If synchronization signals are to be received, you must turn on the Sync In switch on the MIDI Display or the Audio Event Editor.

- On the MIDI Display, move the cursor to the Sync IN field and press the spacebar to change OFF to INPUT. With an 8-output MIDI unit, you may select the AUX (auxiliary) input if desired.
- On the Audio Event Editor Sync panel, step the Synchronization switch to MIDI In.

The Synclavier sequencer is set to respond to external synchronization signals received at the selected port.

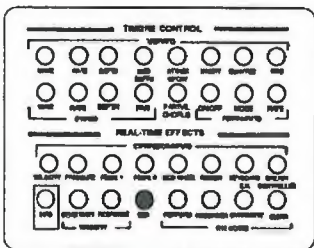
When you press START on the Synclavier sequencer, it does not start until the external signal is received at the MIDI IN or AUX port.

Regardless of the number of MIDI modules installed, only the first MIDI IN and MIDI AUX ports can be used for sync input. No other MIDI IN or AUX inputs are active.

Synchronization settings are reset to off whenever a new timbre is recalled to the keyboard.

WARNING: Do not use MIDI sync when recording or playing back on the Direct-to-Disk.

7.18 Studio operations



You can turn on MIDI IN synchronization from the keyboard control panel.

- ## INTERNAL SYNC

- The display window changes to

MIDI IN SYNC

The Synclavier sequencer is set to respond to external synchronization signals received at the selected port.

When you press START on the Synclavier sequencer, it does not start until the external signal is received at the MIDI IN or AUX port.

To turn off MIDI sync

- Press and hold the EXT SYNC MODE button while you press the MIDI button.

The display window shows

INTERNAL SYNC

Where to set MIDI parameters

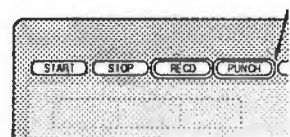
You can set MIDI parameters from the keyboard control panel or from one of several displays.

Input parameters	Interface
individual channel to keyboard assignment	MIDI Display Sequence Editor
all channels to recorder assignment (channels 1–16 routed to tracks 1–16)	Keyboard control panel Sequence Editor
channel to individual track assignments (channels 1–16 routed to selected tracks)	Sequence Editor
synchronization to MIDI input	Keyboard control panel MIDI Display Audio Event Editor
Output parameters	Interface
keyboard routing	Keyboard control panel MIDI Display
track routing	Keyboard control panel MIDI Display
pressure type	MIDI Display
synchronization routing	MIDI Display
echo	Keyboard control panel MIDI Display

*Where to set
MIDI parameters*

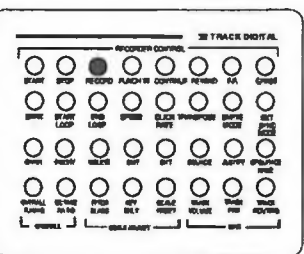
Single track recording and playback

You can perform and record on the Synclavier from a MIDI device using Synclavier timbres, MIDI device timbres or both.



Sequence Editor motion control panel (detail)

SEQUENCER MOTION CONTROL											
START	STOP	CONT	REW	FORWD	MIDI RECD	MIDI PUNCH					
1 02	03 04	05 06	07 08	09 10							
1 12	13 14	15 16	17 18	19 20	STORE	ON/OFF					



Keyboard control panel 2

7.20 Studio operations

Sounding and recording the Synclavier from a MIDI keyboard

Make sure the required MIDI connections are made and the devices you expect to sound are connected to your sound system.

1. Recall a Synclavier timbre (and a MIDI device timbre, if desired).
2. Set the required Synclavier input and output parameters as described in "MIDI output parameters" and "MIDI input parameters."

Input: ALL
Output: KBD Out 1; Chan 1

3. Set the required MIDI device input and output parameters according to its instructions.

Input: ALL or 1
Output: Out 1; any channel

4. Play on the MIDI keyboard.

The Synclavier and MIDI keyboard timbres sound.

5. Patch any real-time effects as desired. The pitch wheel from the MIDI keyboard is always active.
6. Record and play back your performance from the Sequence Editor Audio Event Editor or keyboard control panel.

Any Synclavier track recorded is automatically assigned the Out port and channel of the keyboard timbre.

Sounding a MIDI device from the Synclavier keyboard

Make sure the required MIDI connections are made and the devices you expect to sound are connected to your sound system.

1. Recall a MIDI device timbre (and a Synclavier timbre, if desired).
2. Set the required Synclavier input and output parameters as described in "MIDI output parameters" and "MIDI input parameters."

Input:

Output: KBD Out 1; Chan 1

3. Set the required MIDI device input and output parameters according to its instructions.

Input: ALL or 1

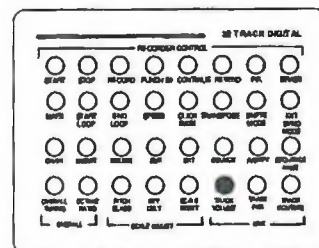
Output:

4. If you want to hear only the MIDI synthesizer, turn down the Synclavier at the mixer or lower its keyboard volume using the TRACK VOLUME button.

5. Play on the Synclavier keyboard.

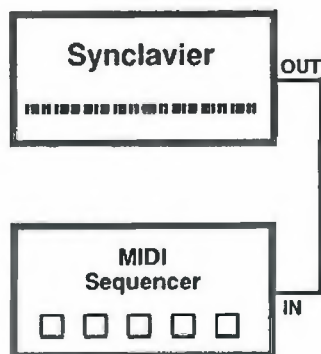
The MIDI device and Synclavier timbres sound.

6. Patch real-time effects as desired.



TRACK VOLUME
panel 2

Single track recording and playback (con't)



Recording the Synclavier keyboard onto a MIDI sequencer

Make sure the required MIDI connections are made and the devices you expect to sound are connected to your sound system.

1. Recall a Synclavier timbre.
2. Set up real-time effects on the Synclavier as desired.
3. Set the required Synclavier input and output parameters as described in "MIDI output parameters" and "MIDI input parameters."

Input:

Output: KBD Out 1; Chan 1

4. Set the required MIDI device input and output parameters according to its instructions.

Input: ALL or 1

Output:

5. If the Synclavier timbre uses a key pressure setting, set the MIDI pressure parameter.
6. Set up the MIDI sequencer to record MIDI channel 1 according to its instructions.
7. Start recording on the MIDI sequencer.
8. Play on the Synclavier keyboard.

The Synclavier notes are recorded into the MIDI sequencer.

Playing back a sequence from a MIDI sequencer

When you play back a sequence from a MIDI sequencer, the sounds are produced by the Synclavier but controlled by the MIDI sequencer.

Make sure the required MIDI connections are made and the devices you expect to sound are connected to your sound system.

1. Recall a Synclavier timbre.
2. Set the required Synclavier input and output parameters as described in "MIDI output parameters" and "MIDI input parameters."

Input: ALL

Output:

3. Set the required MIDI device input and output parameters according to its instructions.

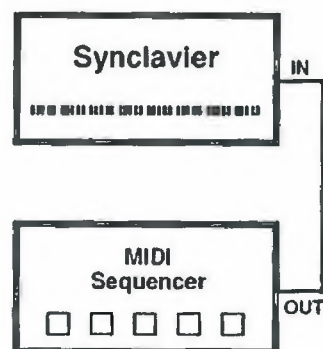
Input:

Output: Out 1; any channel

4. Start the MIDI sequencer.

The Synclavier timbre is sounded by the MIDI sequencer.

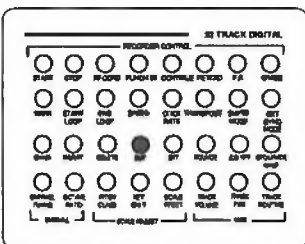
Additional devices can be driven from the MIDI sequencer by connecting them to a MIDI THRU port on the Synclavier.



Multitrack recording and playback

You can record up to 16 tracks from a MIDI sequencer onto separate tracks of the internal sequencer. You can simultaneously record from the Synclavier keyboard onto another track. Each of these tracks can have a different timbre.

You can also play back up to 16 tracks from a MIDI sequencer using up to 16 timbres assigned to Synclavier tracks.



Assigning Synclavier timbres from the keyboard control panel

If you record into the internal sequencer without assigning track timbres, the recorded notes will not be heard. You can assign a timbre to a track from the current timbre directory, the keyboard or from another track.

1. Select the Timbre Directory from the Main or Welcome Menu to see the timbres available in the current catalog.
2. Press the SMT (Select Memory Timbre) button on the keyboard control panel.

The SMT button lights, and the TRACK SELECT buttons blink.

3. Using the TRACK SELECT buttons, select the track on which you wish to place the new timbre.

The TRACK SELECT buttons remain lit, and the TIMBRE/SEQUENCE STORAGE buttons begin blinking.

4. Select a timbre from another track by pressing a TRACK SELECT button; select a timbre from the current timbre directory using the BANK, ENTRY, and TIMBRE/SEQUENCE STORAGE buttons.

The numbered TRACK SELECT and TIMBRE/SEQUENCE STORAGE buttons go out, and the new timbre is placed on the selected track.

Assigning Synclavier timbres from the Sequence Editor

If you record into the internal sequencer without assigning track timbres, the recorded notes will not be heard. You can assign a timbre to a track from the current timbre directory, the keyboard (current timbre) or from another track.

1. Click on SMT (Select Memory Timbre) in the Commands panel.

The SMT dialog appears with Keyboard as the default source and Track 1 as the default destination.

2. Select the desired timbre source by stepping the options: Track, Keyboard or Bank and Entry.

The number field after the selection blinks.

3. If you are copying the timbre from a timbre bank and entry or from a track, step the number field(s) up or down, or type in the desired number(s).

4. Select a destination by stepping the number field up or down, or typing in a number.

5. Click on the SMT button in the lower left of the Dialog panel.

The desired timbre is placed on the selected track.

Alternate method of entering numbers

You can transfer numbers from the Track Display of the Sequence Editor.

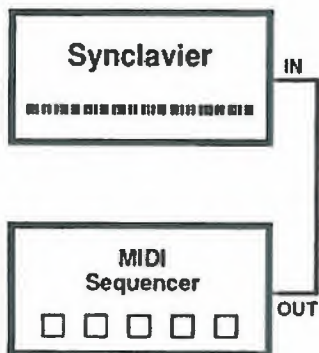
1. Click on a number field in the Dialog panel.

The number highlights.

2. Click on a number in the Track Display.

That number appears in the selected field.

Multitrack recording and playback (con't)



Playing back a MIDI sequence with Synclavier timbres

Make sure the required MIDI connections are made and the devices you expect to sound are connected to your sound system.

1. Place timbres on each Synclavier track being used as described on the preceding pages.
2. Set the required Synclavier input and output parameters as described in "MIDI output parameters" and "MIDI input parameters."

Input: RECORDER

Route incoming channels to the desired tracks

Output:

3. Set the required MIDI device input and output parameters according to its instructions.

Input:

Output: Out 1

Route each track to a separate channel

4. Start the MIDI sequencer.

The MIDI sequencer tracks sound with the timbres assigned to the selected Synclavier tracks.

Setting up for multitrack recording from MIDI to internal sequencer

Make sure the required MIDI connections are made and the devices you expect to sound are connected to your sound system.

1. Set the required Synclavier input and output parameters as described in "MIDI output parameters" and "MIDI input parameters."

Input: ALL

MIDI mapped to Recorder

Desired tracks assigned to MIDI channels

MIDI Sync In: ON

Output:

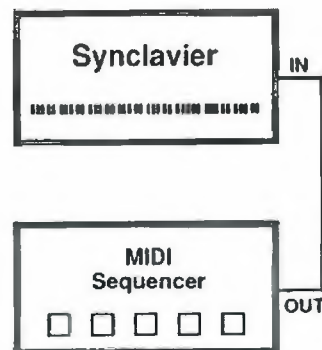
2. Set the required MIDI device input and output parameters according to its instructions.

Input:

Output: Out 1

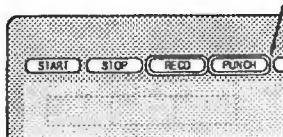
Desired tracks assigned to MIDI channels

3. Set up the MIDI sequencer or other MIDI devices to play according to their instructions.
4. Place timbres on each Synclavier track being used as described above..
5. Turn on justification, if desired, and set a click rate. You may also want to set a click rate multiplier.



Multitrack recording and playback (con't)

Bounce
Change Duration
Change RTE
Change Velocity
Cut/Paste
Edit Filter
Fit to Time
Justify
MIDI Mapping
Settings
Sequence Files
SKT
SMT
Track Volume
Transpose
Unwrap Loops



Recording from MIDI to internal sequencer using the Sequence Editor

1. Click on READY TRACKS in the MIDI Mapping dialog.
2. On the Display panel, select the tracks for recording that have been assigned to MIDI IN channels.

Selected tracks highlight. (If you change your mind, you can clear all track selections by clicking ALL SAFE in the dialog panel.)

3. If desired, click READY TRACKS again and select an additional track to record the Synclavier keyboard.

The previously selected track numbers are unlit. The track number selected for the keyboard blinks.

You can click READY TRACKS repeatedly to view alternately the track selected for recording the Synclavier keyboard or those selected for recording incoming MIDI channels.

3. Click RECD (record) in the Sequence Editor Motion Control panel, start the MIDI sequencer and play on the Synclavier keyboard.

Input from MIDI channels and the Synclavier keyboard is recorded simultaneously on selected tracks with Synclavier timbres assigned to those tracks.

If you did not select a track for the keyboard, any keyboard notes played are recorded on the first track having the same timbre as the keyboard or on the first empty track. If a MIDI channel is routed to the same track, the notes from both sources are merged.

Recording from MIDI to internal sequencer using the keyboard control panel

1. Press and hold the MIDI button while you press TRACK SELECT buttons to select tracks for recording.

Selected tracks blink as long as you hold the MIDI button.

2. If desired, select an additional track to record the Synclavier keyboard by pressing another TRACK SELECT button without holding the MIDI button.

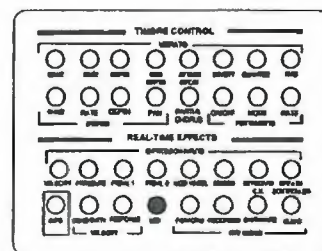
The previously selected TRACK SELECT buttons are unlit; the button selected for the keyboard blinks.

You can press and release the MIDI button to view alternately the tracks selected for recording incoming MIDI channels and the track selected for recording the Synclavier keyboard.

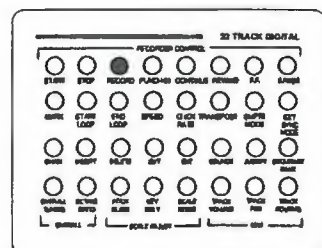
3. Press **RECORD** and start the MIDI sequencer. If you are recording the Synclavier as well, play on the Synclavier keyboard.

Input from MIDI channels and the Synclavier keyboard is recorded simultaneously on selected tracks with Synclavier timbres assigned to those tracks.

If you did not select a track for the keyboard, any keyboard notes played are recorded on the first track having the same timbre as the keyboard or on the first empty track. If a MIDI channel is routed to the first track with a timbre matching the keyboard, the notes from both sources are merged.

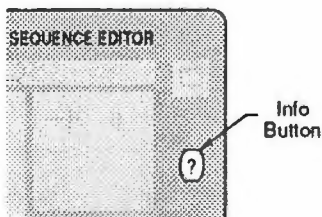


MIDI
panel 5



RECORD
panel 2

Multitrack recording and playback (con't)



Determining track status

You can determine whether a track is empty, has notes recorded, has a timbre assigned or has both timbre assigned and notes recorded.

1. Click INFO (?) on the Sequence Editor or press INFO on the keyboard control panel.

Track numbers or buttons having a timbre assigned or notes recorded light.

2. Hold the appropriate track number or button.

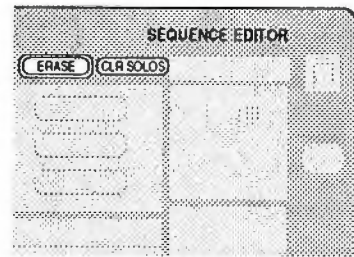
A message at the top of the Sequence Editor and in the keyboard control panel display window shows the timbre assigned to the track and the number of notes from the present position of the song pointer to the end of the sequence.

Erasing notes without erasing the track timbre

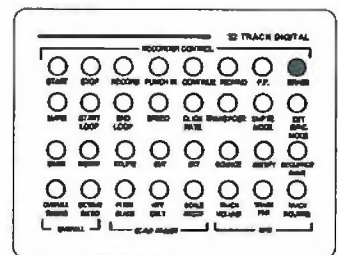
When MIDI IN channels have been routed to the internal sequencer, you can erase recorded notes without erasing the track timbre.

1. Select track or tracks to be erased.
2. Press (click) ERASE twice.

If you erase the entire sequence with no tracks selected, all notes and timbres are erased.

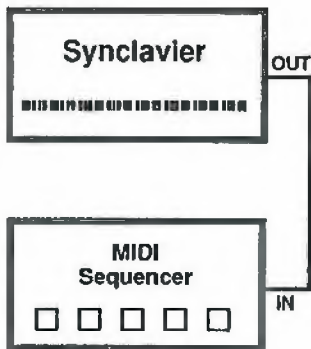


Sequence Editor (detail)



ERASE
panel 2

Multitrack recording and playback (con't)



Recording on a MIDI sequencer

Make sure the required MIDI connections are made and the devices you expect to sound are connected to your sound system.

1. Set the required Synclavier input and output parameters as described in "MIDI output parameters" and "MIDI input parameters."

Input:

Output: Desired tracks set to OUT and CHAN

Pressure type set, if sent

MIDI Sync Out: 1

2. Set the required MIDI device input and output parameters according to its instructions.

Input: Desired tracks assigned to MIDI channels

External synchronization: ON

Output:

3. Set the tempo on the MIDI sequencer to match the Synclavier click rate.
4. Start recording on the MIDI sequencer and press START on the Synclavier.

The MIDI sequencer begins to record. Up to 16 Synclavier tracks are recorded simultaneously on separate tracks of the MIDI sequencer (according to the capabilities of the MIDI sequencer).

WARNING: Do not use the Music Notation or Recorder Displays while transferring sequences. The time required to update the terminal from these displays may cause timing errors in the sequence transfer.

Playing back on other MIDI devices from the internal sequencer

Make sure the required MIDI connections are made and the devices you expect to sound are connected to your sound system.

1. Set the required Synclavier input and output parameters as described in "MIDI output parameters" and "MIDI input parameters."

Input:

Output: Desired tracks set to OUT and CHAN

Pressure type set, if sent

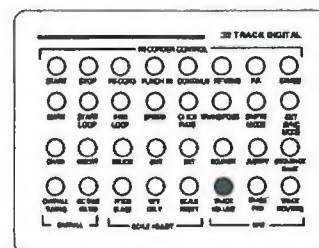
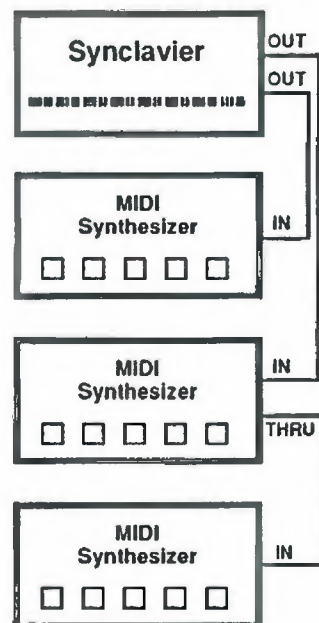
2. Set the required input and output parameters for each MIDI device according to its instructions.

Input: Each MIDI device set to respond to the desired channel

Output:

3. Set the desired timbres on each MIDI device.
4. If you want to hear only the MIDI synthesizers, turn down the Synclavier at the mixer or lower the volume of its tracks using the TRACK VOLUME button or the Audio Event Editor Event List Editor.
5. Press START to start the internal sequencer.

The MIDI devices and Synclavier timbres sound.



TRACK VOLUME
panel 2

MIDI song pointer

You can use the MIDI song pointer to synchronize an internal sequence with a sequence recorded on a MIDI device.

Using the MIDI song pointer

Since the internal sequencer sends and receives the MIDI song pointer, you can set a MIDI sequencer slaved to the internal sequencer to start at a predetermined point in the sequence and maintain synchronization. You can also use a song pointer message to start the internal sequencer at a point within a sequence when it is slaved to a MIDI sequencer.

When using SMPTE time code recorded on tape to drive the internal sequencer, the MIDI song pointer is sent automatically with MIDI clock signals. When not using SMPTE, the song pointer must be sent manually. This allows the MIDI sequencer time to position itself before you start the internal sequencer.

Sending a MIDI song pointer from the keyboard control panel

1. From the MIDI Display, set MIDI Sync Out: to the desired port and check MIDI routings and connections.
2. Use the MARK button to set a mark point.

The mark point must be on a beat. Use the justify mode to ensure this.

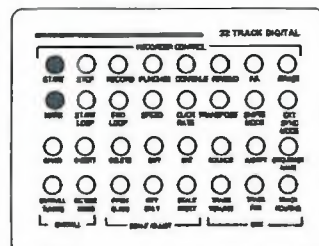
3. Hold the MARK button and press START.

A MIDI song pointer message is sent on all channels through the port assigned to Sync Out. The MIDI sequencer receiving the song pointer message is positioned to begin playing at the mark point, and the Synclavier mark point is turned on.

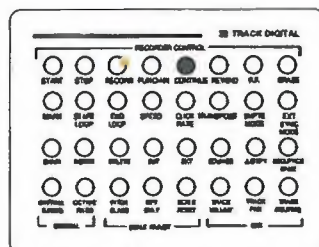
4. Press CONTINUE.

The MIDI and the Synclavier sequences begin playing in sync. If you have recorded the Synclavier sequence with a count-in measure, there is a one-bar difference between the MIDI sequence and the Synclavier sequence.

NOTE: If you press START, rather than CONTINUE, the MIDI sequence starts playing at the beginning of the sequence, while the Synclavier sequence starts playing from the specified mark point.



MARK and START
panel 2



MIDI song pointer (con't)

Sending a MIDI song pointer from the Audio Event Editor

You can specify any location in a sequence by a locator point which can be used as a MIDI song pointer.

1. From the MIDI Display, set MIDI Sync Out: to the desired MIDI OUT port.
2. Enter a time into the LOCATOR time field at the bottom middle of the Sequencer Motion Control panel by typing a time, clicking the LOCATOR take button while the sequence is playing or clicking a numbered LOCATOR button.
3. Click the MIDI LOCATE button.

The current time in the internal sequence is reset to the LOCATOR time. A MIDI song pointer message is sent out on all channels of the MIDI OUT port selected for Sync Out: and all MIDI sequencers connected to this port are reset to the LOCATOR time.

4. Record or play the MIDI sequence as described above.

Naming and storing locator points

You can name and store up to twenty locator points in the numbered LOCATOR buttons on the left side of the Audio Event Editor Motion Control panel.

1. Click the LOCATOR caption field to the right of the LOCATOR time field and type in a caption.
2. Click STORE.
3. Click the numbered LOCATOR button where you want to store the time.

The current time is stored and can be recalled simply by clicking the LOCATOR button.

Sending and receiving real-time effects

When performing on the Synclavier keyboard, you can send real-time effects information to other MIDI devices. Similarly, real-time effects information from other keyboards is received and understood by the Synclavier.

Synclavier real-time effects

The Synclavier sends and receives real-time effects (expression) information. MIDI controller messages that relay this information correspond to the Synclavier real-time effects controllers as shown on the opposite page.

Velocity information based on Synclavier sensitivity and response settings is sent with MIDI. The Synclavier responds to velocity signals received from MIDI sources only in relation to the sensitivity setting.

Channel pressure, used by some types of MIDI keyboard devices, is a control signal based on the total pressure of keyboard keys pressed at one time. **Individual pressure**, used on the Synclavier, is a separate control signal based on the pressure on each individual key. Although the Synclavier produces only individual key pressure signals, it can record and transmit either.

Channel pressure and other types of controller messages not understood by the Synclavier are recorded with the Synclavier sequence. When the Synclavier sequence is subsequently used to control MIDI devices, these recorded messages are sent.

Incoming channel pressure can be converted to individual pressure, if desired (see "Displaying and Editing MIDI messages").

All recorded real-time effects and real-time effects values can be edited from the Recorder Display or the Event list Editor panel of the Audio Event Editor.

Synclavier controller	MIDI controller message
-----------------------	-------------------------

Key velocity	Key velocity
Individual key pressure	Individual pressure
	Channel pressure*
Pitch wheel	Pitch wheel
Mod wheel	Modulation wheel
Ribbon	No MIDI equivalent
Breath controller	Breath controller
Pedal 1	Overall volume pedal
Pedal 2	Modulation pedal
Sustain	Sustain switch
Portamento	Portamento switch

*Real-time effects
equivalents*

* The Synclavier records and sends channel pressure data but does not produce it.

Sending and receiving real-time effects (con't)

Selective real-time effects filtering

You can choose to send real-time effects information to other MIDI devices from any or all of the Synclavier controllers without affecting the real-time effects patching on the Synclavier keyboard. For example, if the MIDI output of the velocity controller is deactivated, the Synclavier keyboard timbre continues to be affected by your keyboard touch while the timbre on the receiving MIDI device is not.

1. With the MIDI devices connected and the MIDI parameters assigned as explained above, press and hold the MIDI button on the keyboard control panel.

The MIDI button and all controller buttons ready to send real-time effects message light. Buttons that are inactive but available flicker. The display window shows

MIDI: O [number] C[number]
SELECT PATCHING

2. Continue to hold the MIDI button while you press a flickering button to activate a controller or a lit button to deactivate a controller.

The active or inactive state of the MIDI output of any Synclavier expression controller is a part of the current timbre and is stored with any track recorded with that timbre.

Note: The PARTIAL TUNING button is used to activate MIDI output of the PITCH WHEEL controller. At present there is no MIDI equivalent for RIBBON. The SUSTAIN and PORTAMENTO switch MIDI output cannot be turned off.

Synclavier controller	MIDI output default status	controlling button
PITCH WHEEL	active	PARTIAL TUNING
VELOCITY	active	VELOCITY
PRESSURE	inactive	PRESSURE
PEDAL 1	inactive	PEDAL 1
PEDAL 2	active	PEDAL 2
MOD WHEEL	active	MOD WHEEL
RIBBON	inactive	RIBBON*
BREATH CONTROLLER	active	BREATH CONTROLLER
SUSTAIN SWITCH	active	-----
PORTAMENTO SWITCH	active	-----

*MIDI controller
default output
settings*

* At present there is no MIDI equivalent for RIBBON.

MIDI program changes

MIDI program change messages are signals that tell a receiving device to change timbres.

Sending program change messages

The Synclavier records and transmits program change messages but does not perform them. You can send program changes from the Synclavier either during live performance or from a recorded sequence during playback. You can also enter program change messages into a sequence that has already been recorded.

Program change messages can be sent in real-time from the keyboard control panel using either the BANK and ENTRY buttons or the MIDI SKT function.

They are sent out automatically as the sequence is played back if they are recorded on the Synclavier sequencer from another MIDI device.

They can also be entered into a previously recorded sequence using the Recorder Display or Audio Event Editor. Once entered, they are sent out when the sequence is played back (see "Displaying and editing MIDI messages").

MIDI program changes for each track are stored with the sequence and are transmitted on the MIDI output channels to which each track is routed.

Sending program changes with the MIDI SKT function

During live performances, MIDI program changes can be sent to MIDI devices from empty sequencer tracks assigned to different MIDI OUT ports and channels.

Make sure the required MIDI connections are made and the devices you expect to sound are connected to your sound system.

1. Enter the desired program changes on selected empty tracks as explained in "Editing MIDI messages" below.
2. Press and hold the MIDI button while you press SKT.

The display window shows

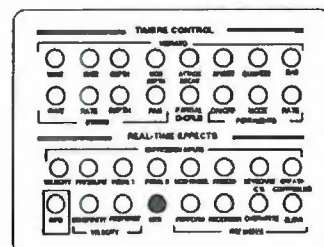
Program Change
On SKT: On

The MIDI/SKT function is turned on.

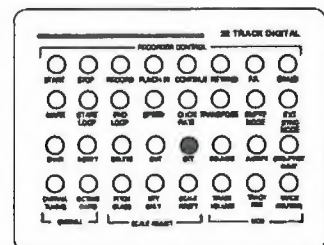
3. Each time you want to send a program change to a MIDI device, press SKT and the TRACK SELECT button of the track with the desired program change.

The program change recorded on the track is sent to the MIDI device to which that track is routed.

4. When you have finished sending program changes, hold the MIDI button while you press SKT to toggle the MIDI/SKT function off.

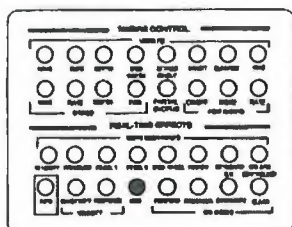


MIDI
panel 5



SKT
panel 2

MIDI program changes (con't)



Sending program changes with BANK and ENTRY buttons

Make sure all MIDI devices are connected and MIDI OUT, IN and synchronization parameters are set as explained above.

1. Press and hold the MIDI button on the keyboard control panel.

The display window shows

MIDI: OUTPUT OFF
SELECT PATCHING

2. Continue to hold the MIDI button while you press BANK and then a numbered button on panel 4.
3. For programs 1–64, continue to hold MIDI while you press ENTRY and then a numbered button on panel 4.

A program change message between 1 and 64 is sent out the port and channel assigned to the keyboard.

For programs 65–128, continue to hold MIDI while you press ENTRY, LIBRARY and a numbered button on panel 4.

A program change message between 65 and 128 is sent out the port and channel assigned to the keyboard.

ENTRY	BANK							
	1	2	3	4	5	6	7	8
1	1	9	17	25	33	41	49	57
2	2	10	18	26	34	42	50	58
3	3	11	19	27	35	43	51	59
4	4	12	20	28	36	44	52	60
5	5	13	21	29	37	45	53	61
6	6	14	22	30	38	46	54	62
7	7	15	23	31	39	47	55	63
8	8	16	24	32	40	48	56	64

PROGRAM CHANGE NUMBERS

LIBRARY ENTRY	BANK							
	1	2	3	4	5	6	7	8
1	65	73	81	89	97	105	113	121
2	66	74	82	90	98	106	114	122
3	67	75	83	91	99	107	115	123
4	68	76	84	92	100	108	116	124
5	69	77	85	93	101	109	117	125
6	70	78	86	94	102	110	118	126
7	71	79	87	95	103	111	119	127
8	72	80	88	96	104	112	120	128

PROGRAM CHANGE NUMBERS

Displaying and editing MIDI messages

You can display and edit all MIDI messages—real-time effects, system exclusive and program change messages—that have been recorded on the internal sequencer tracks. You can also enter any messages that you want to add to an already recorded sequence.

MIDI message editing can be done from either the Recorder Display or the Event List Editor of the Audio Event Editor.

Displaying MIDI messages

MIDI messages appear as abbreviations in the track columns of both the Recorder Display and the Event List Editor.

MIDI message	Recorder Display abbreviation	Event List Editor abbreviation
Volume pedal	Ped1	Pd1
Modulation pedal	Ped2	Pd2
Modulation wheel	ModW	Mod
Ribbon controller	RibF	Rib
Breath controller	Brth	Brt
Pitch wheel	Pitch	Ptc
Pressure	PrC#2	Pre
Program change	MiPgm	Mpg
System exclusive	SysEx	Sys

System exclusive message values can be expressed in hexadecimal or decimal units.

- Press the Spacebar to toggle between the two modes.

Very large system exclusive messages that fill many screens may cause delay on playback.

Recorder Display

MEMORY RECORDER COMPARATIVE TRACK DISPLAY									
Change Selections: (SPACE)		Insert Note : -		Ped1	Ped2	ModW			
Review Instructions: (TAB)		Append Note: +		RibF	Brth	Pch			
Add Independent Loop: ~		Append EFX: *		PrC#2	MiPgm	SysEx			
Show Times in : SECONDS Show Sound File Offsets: YES UNDO enabled: YES									
Dur/End/Name/Vel: DURATION Show Real-Time Effects: YES Note Ripple: Off									
Track 1 "GUITAR G1-C5 1.1"			Track 2			Track 3			
Seconds		Duration							
26.000	A3	1.000							
27.000	ModW	100.0							
27.000	D3	1.000							
27.000	MPgm	6							
27.000	B2	1.000							
27.000	G1	1.000							
Current Catalog: W0:									

Event List Editor panel

EVENT LIST EDITOR																	
00:01:00:00.00		<input type="checkbox"/>	1.	..	100.0	<input type="checkbox"/>	2.	..	100.0	<input type="checkbox"/>	3.	..	100.0	<input type="checkbox"/>	4.	..	100.0
Event Start Time																	
00:01:10:00.00		C4															
00:01:56:14.00		B3															
00:02:15:00.00		Mpg 3															
00:02:35:00.00		A3															
00:02:56:00.00		G3															
00:03:47:00.00		E3															
00:04:26:22.00		D3															
00:06:35:00.00		E3															
00:08:48:00.00		D3															
00:08:56:00.00		C3															
Set Display	Select Time	Set Edit	Select	Verify		Add Note	Add Ind Lp	Delete	Move	Play							
Contents	Format	Features	Tracks			Add Note +	Add RTE	Events	Copy	From							
No. Of	No. Of	10	Show	Event	RTE	Loops	Pch	MIDI	Event	Duration	End	Velocity	Caption	Name	Len:	8	
Tracks:	Rows:						Name	Note #	Name	Time							

Displaying and editing MIDI messages (con't)

Editing MIDI messages on the Recorder Display

You can add a MIDI message to a recorded track or enter one on an empty track.

1. Select the Recorder Display.
2. Press TAB to select the Display Mode.
3. Click on the Show Real-Time Effects field to toggle NO to YES.
4. Move the cursor to any column of the selected track at the note position where you want a message added and type * (star). If the desired message abbreviation does not appear, type it in and press Return.
5. Move the cursor to the third column, type the desired real-time effect value or message number and press Return.
6. Repeat steps 4 and 5 as many times as necessary to enter real-time effects or MIDI messages where needed on the desired tracks.
7. Save the sequence.

Editing MIDI messages on the Audio Event Editor

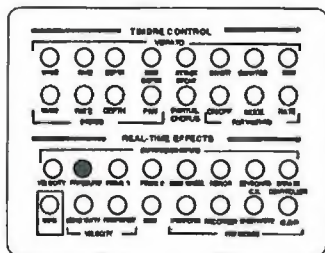
You can add a MIDI message to a recorded track or enter one on an empty track.

1. Select the Audio Event Editor.
2. Select the Event List Editor.
3. Click Set Display Contents and adjust the number of tracks and items displayed so that Events, RTEs and Pitch Name are displayed.
4. Click the event after which you want the effect or message added.
5. Click Add RTE.

Mod (Mod Wheel) and a value 100.0 are inserted after the selected event at the same start time.

6. You can select a different effect or message by clicking the abbreviation and typing a different one.
7. You can change the value or number of the effect or message by clicking it and entering a new one.

Displaying and editing MIDI messages (con't)



Converting channel pressure

Channel pressure from MIDI devices sending pressure information in OMNI OFF/MONO mode (MIDI mode 4) can be converted to Synclavier individual (poly) pressure.

- On the Synclavier keyboard control panel, press and hold PRESSURE while you press START. The keyboard display window shows

Convert Channel
To Poly: ON

The pressure conversion feature is turned ON. All incoming channel pressure information from MIDI devices that send it in OMNI OFF/MONO mode (MIDI mode 4) is converted to individual pressure.

- Hold PRESSURE and press STOP.

The pressure conversion feature is turned OFF.

Default is OFF.

Function...		Transmitted	Received	Remarks
Basic Channel	Default Changed	1 - 16 ¹ 1 - 16 ¹	all channels 1 - 16	
Mode	Default Message Altered	1 s	1 1, 2, 3 X	
Note Number	True voice	24-108	0-127	
Velocity	Note ON Note OFF	O 9nH, v=1-127 O 9nH, v=0	O ² O ²	
After Touch	Keys Ch's	O ¹ O ¹	O ² O ²	
Pitch Bender		O	O ²	7-bit resolution
Control	1 Mod wheel 2 Breath control 4 Mod pedal 7 Volume pedal 64 Sustain switch 65 Portamento switch	O O O O O O	O ² O ² O ² O ² O ² O ²	Modulation Wheel Breath Control Pedal 2 (modulation) Pedal 1 (volume) Sustain Foot sw Portamento Foot sw
Program Change	: True #	O	O ²	Program changes recorded, played and sent. Synclavier does not change programs.
System Exclusive		O	O ²	
System Common	: Song Pos : Song Sel : Tune	O X X	O X X	
System Real-Time	: Clock : Commands	O O	O O	
Aux Messages	: Local ON/OFF : All Notes OFF : Active Sense : Reset	X O X X	X O X X	
NOTES	1 Information stored with sequence 2 Information recorded by memory recorder.			

Mode 1 : OMNI ON, POLY **Mode 2** : OMNI ON, MONO O : Yes
Mode 3 : OMNI OFF, POLY **Mode 4** : OMNI OFF, MONO X : No